DOCUMENT RESUME

ED 347 087 SE 052 922

AUTHOR Koprowicz, Constance L.
TITLE Science Education in the States: A Survey.
INSTITUTION National Conference of State Legislatures, Denver, CO.
REPORT NO ISBN-1-55516-272-x
PUB DATE 90
NOTE 12p.
AVAILABLE FROM NCSL Book Order Dept., 1560 Broadway, Suite 700, Denver, CO 80202.
PUB TYPE Reports - Research/Technical (143) -- Collected Works - Serials (022)
JOURNAL CIT State Legislative Report; v15 n16 Oct 1990

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Biology; Chemistry; Computer Uses in Education; Curriculum Development; Earth Science; *Educational Change; Elementary Secondary Education; Evaluation; Financial Support; Inservice Teacher Education; Integrated Curriculum; Mathematics Education; Mentors; Middle Schools; Physical Sciences; Professional Development; *Program Descriptions; Public Education; Science Education; Science Instruction; Space Sciences; *State Action; State Departments of Education; *State Programs; Telecommunications
IDENTIFIERS Microcomputer Based Laboratories; Project 2061 (AAAS); Technology Education

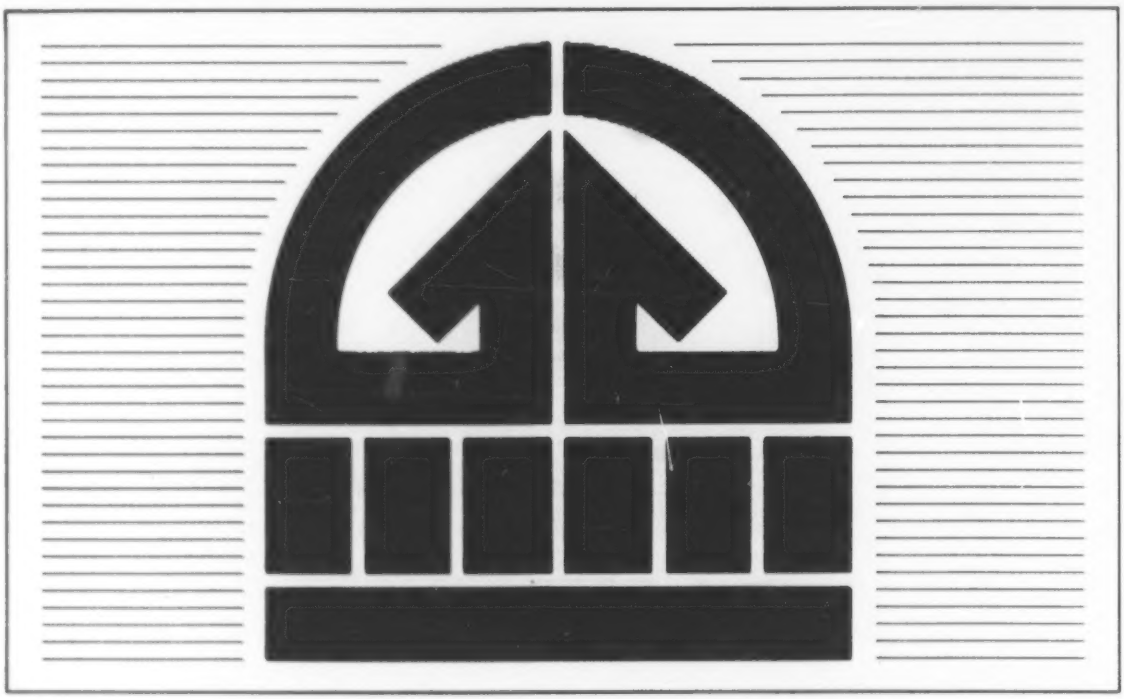
ABSTRACT

In January 1990, the National Conference of State Legislatures surveyed the curriculum directors at each state department of education regarding efforts to improve science education. Those surveyed were asked to list and describe statewide science education programs in the public schools and the involvement of state legislatures in creating and sustaining those programs. This report highlights the actions of nine states and the District of Columbia in this curriculum area, and provides brief descriptions of activities being implemented in all responding states (31 in all). The nine states included are: (1) California; (2) Colorado; (3) Kansas; (4) Kentucky; (5) Michigan; (6) New Hampshire; (7) New York; (8) Oregon; and (9) Rhode Island. A list of respondents at each state's Department of Education is also indexed. (KR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SE

STATE LEGISLATIVE REPORT



ED347087

SCIENCE EDUCATION IN THE STATES: A SURVEY

by

Constance L. Koprowicz
Research Analyst II

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN **OTHER THAN PAPER COPY** HAS BEEN GRANTED BY

G. Loos

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)"

Vol. 15, No. 16 October 1990

An Information Service of the National Conference of State Legislatures
1560 Broadway, Suite 700, Denver, Colorado 80202. William T. Pound, Executive Director

2

SE052922

NEW ADDRESS: 1560 Broadway, Suite 700 Denver, CO 80202

STATE LEGISLATIVE REPORTS

"Fiscal Priorities in the 1990 Legislatures" (Vol. 15, No. 3) (ISBN 1-55516-259-2)	January 1990
"Tracking Technologies for Radioactive Waste Shipments" (Vol. 15, No. 4) (ISBN 1-55516-260-6)	February 1990
"The State Fiscal Outlook: 1990 and the Coming Decade" (Vol. 15, No. 5) (ISBN 1-55516-261-4)	February 1990
"Legislative Staff Salaries--1989" (Vol. 15, No. 6) (ISBN 1-55516-262-2)	February 1990
"Compliance with the Safe Drinking Water Act: State Legislative Options" (Vol. 15, No. 7) (ISBN 1-55516-263-0)	February 1990
"A Comparison of Disposable and Reusable Diapers: Economics, Environmental Impacts and Legislative Options" (Vol. 15, No. 8) (ISBN 1-55516-264-9)	April 1990
"Reorganization and Rescheduling of the Civilian High-Level Waste Program" (Vol. 15, No. 9) (ISBN 1-55516-265-7)	March 1990
"Alternative Technologies for Deicing Highways" (Vol. 15, No. 10) (ISBN 1-55516-266-5)	April 1990
"Protecting Health Care Workers from HIV Infection" (Vol. 15, No. 11) (ISBN 1-55516-267-3)	June 1990
"Adolescents and AIDS: Stopping the Time Bomb" (Vol. 15, No. 12) (ISBN 1-55516-268-1)	June 1990
"Asbestos Disposal: A Legislative Primer" (Vol. 15, No. 13) (ISBN 1-55516-269-X)	July 1990
"Legislative-Judicial Relations: Seeking a New Partnership" (Vol. 15, No. 14) (ISBN 1-55516-270-3)	July 1990
"Pesticide Applications: States Move to Limit Farmer Liability for Groundwater Contamination" (Vol. 15, No. 15) (ISBN 1-55516-271-1)	July 1990
"Science Education in the States: A Survey" (Vol. 15, No. 16) (ISBN 1-55516-272-X)	October 1990

STATE LEGISLATIVE REPORT is published 12 to 18 times a year. It is distributed without charge to legislative leaders, council and research directors, legislative librarians, and selected groups for each issue. For further information on STATE LEGISLATIVE REPORT or to obtain copies, contact the NCSL Book Order Department in Denver at 303/830-2200.

Copyright©1990 by the National Conference of State Legislatures.

Science Education in the States: A Survey

Introduction

American youths know less about science and mathematics than students in other industrialized nations, according to global comparison tests. Concerned that this science and math illiteracy will greatly impair the nation's ability to compete in the world, states are responding by creating new approaches to science curriculum and teacher education.

In January 1990, the National Conference of State Legislatures surveyed the curriculum directors at each state department of education regarding efforts to improve science education. Those surveyed were asked to list and describe statewide science education programs in the public schools and the involvement of state legislatures in creating and sustaining those programs.

This report highlights the actions of nine states and the District of Columbia in this curriculum area and briefly describes activities being implemented in all responding states. A list of respondents at each state department of education is also included.

Survey Highlights

California--Assessment/Implementation Reforms

California is reforming science education through curriculum, assessment, instructional materials and teacher training. California's new "Science Framework" addresses the way science is taught, focusing on small-group learning and the concept of enhancing understanding rather than merely transmitting information. The California Assessment Project (CAP) is working to develop methods for assessing students' knowledge of science during instruction and testing the ability of students to analyze complex scientific and technological issues.

Two models available for changing science education in California are the California Science Implementation Network (CSIN) in elementary schools and the California Scope, Sequence and Coordination (SSC) project in high schools. The CSIN is a two-tier system where "science staff developers" are trained to work with "science mentors" in elementary schools. The mentors will use new instructional materials and procedures to improve science learning in all K-6 classrooms. The SSC project involves 100 high schools where biology, chemistry and physics will be taught to students each week rather than on a traditional sequential basis.

Colorado--Educator's Task Force/Industry Involvement

In Colorado, each school district creates its own individual science curriculum program. A state task force was formed in late 1989 for science and mathematics educators (kindergarten through higher education) to examine ways to integrate curriculum. With industry involvement, the goal is to develop a model K-12 curriculum.

District of Columbia--Computer Programs

The District's Probeware Project combines technology and science instruction. The project enhances the teaching of physical science through an interactive video program which integrates computers and laboratory equipment during science lessons. The Probeware is an electrical unit that, when inserted into a fluid or other experimental substance, detects the temperature, heat, sound and light contained in the substance and directs the results directly into the computer. Funding for Probeware comes from a National Science Foundation grant and Title II funds.

Kansas--Science Academies

The 1988 and 1989 Summer Science Academies in Kansas were aimed at improving elementary school science education, increasing the abilities of elementary school teachers to teach science, creating a network of elementary teachers and administrators who can work with others to improve science teaching, creating developmentally appropriate science curriculum and creating a model for improving science education in many elementary schools.

The proposed 1990 academy will provide educators with content information in chemistry, physics and biology and address the issue of educating teachers. Another goal for this academy is to strengthen both the science background of elementary teachers and their ability to evaluate students and teaching materials.

Also, educators are working to improve the assessment of mathematics education with funding from the Legislature.

Kentucky--Space Education/Technical Assistance for Teachers

Kentucky has several projects to enhance science education. The Space Education Program takes a thematic approach to curriculum by using topics such as aerospace, aviation and space shuttles to create lessons that will incorporate many academic disciplines. For instance, science, math, geography and English can all be incorporated into a lesson about space exploration.

The Elementary Science Leadership Project aims to improve the instruction of science in elementary schools by ensuring strong leadership by elementary school principals as they work to improve school science programs. Principal or lead teacher teams are developed to conduct training programs for teachers in school buildings and serve as science education resources within a school or district.

The Science Improvement Project provides technical assistance to secondary school physical science teachers. Activities include on-site visits, development of guidelines for upgrading science programs, assistance to teachers in using and identifying equipment and demonstration of teaching techniques including the use of computers as classroom and lab tools.

Michigan--Hands-On Assessment/Process-Oriented Curriculum

In 1986, a program was initiated in Michigan to improve science education and student achievement. Funded by state and local governments, business and industry, this program aims to improve teaching and learning at the high school level. Also, Mathematics/Science Challange Grants are funded by the Legislature with $2,210,000 allocated for the 1989-90 school year.

New Hampshire--University Involvement/Conferences for School Personnel

A position paper on the status of math and science education which recognizes the need to renew teacher preparation programs in New Hampshire is being developed by the Department of Education and the University of New Hampshire's College of Engineering and Physical Sciences.

Also, three conferences were held in 1989 to acquaint teachers, administrators, school board members and legislators with the recommendations made by the National Council of Teachers of Mathematics and the American Association for the Advancement of Science (Project 2061). These resulted in district initiatives to review and revise mathematics and science programs. Intentions include preparing mathematics and science "teacher specialists" to serve as resources to teachers, and requiring programs to address both mathematics and science and the connections between the two disciplines.

New York--Hands-On Assessment/Process-Oriented Curriculum

Hands-on assessment has been a major thrust in New York's elementary schools. In May 1989, fourth grade students were assessed using manipulative materials which encouraged personnel to provide more hands-on instruction at the K-6 level. New middle school curriculum will be developed based on successes in the elementary science program.

In high schools, the state's Regent Earth Science course of study is now more process oriented. A new second-year course called "unified science" is being implemented statewide, focusing on persistent problems of humans and the interrelationships of science, technology and society.

Oregon--Curriculum Reform/ Teacher Network

Major statewide science reform efforts are resulting from Oregon's Action Plan for Excellence (OAPE). Efforts include curriculum improvement, selection and development of instructional materials, staff development and assessment for all curriculum areas.

The Oregon Cadre for Assistance to Teachers of Sciences (OCATS) is a statewide network of K-12 and higher education science teachers dedicated to improving instruction through staff development. Assistance is given to teachers to help them recognize student needs, increase access to resources, make curriculum decisions and increase students' levels of scientific, technological and environmental literacy. Activities include developing a comprehensive science education plan for Oregon, facilitating selection of instructional materials and conducting workshops to enhance science instructional methods.

Rhode Island--Telecommunications/Teacher Training

In Rhode Island's SCI-TECH program, 24 science educators created telecommunication projects for student actvities in climate, earthquakes, ecological systems, epidemics and wildflowers. This state also has a "Science Olympiad" to train teachers in science activities that enhance and extend the science curriculum. In addition, a grant from the state legislature has supported the Northern Rhode Island Collaborative, a network of 10 high schools created to enhance curriculum development for math and science.

Survey Responses

Alabama	Efforts are being made to revise Alabama's accreditation standards in order to strengthen science education.
Arkansas	Science education in Arkansas is being promoted through Project Wild, Project Learning Tree, Principles of Technology and Science, Technology and Society.
California	California's new "Science Framework" addresses the way science is taught; the California Assessment Project (CAP) is planning new assessment techniques; the California Science Implementation Network (CSIN) addresses staff development in elementary schools; and the California Scope, Sequence and Coordination (SSC) project addresses high school science curriculum.
Colorado	A task force was formed in late 1989 in Colorado for science and mathematics educators (kindergarten through higher education) to examine ways to integrate curriculum. Industry involvement is also encouraged.
Connecticut	This state has science programs such as Operation Physics, Chemical Education for Public Understanding, a microcomputer-based lab program,

and the Institute for Teaching and Learning. The Institute and Operation Physics are supported through state legislation.

District of Columbia — The District's Probeware Project combines technology and science instruction on topics such as temperature, heat and sound, and using computers to teach the physical sciences.

Georgia — This state has a program called "LINK: A Middle School Math/Science Program for Excellence." Educators hope to improve student achievement in math and science by retraining teachers and reallocating class time in these subjects to provide students with more hands-on activities.

Also, Georgia's Innovation Grant Program, part of the Quality Basic Education Act of 1985, provides grants to school districts for the development, improvement and implementation of educational programs in many academic areas including science and math.

Hawaii — Examples of Hawaii's science education programs are Activities Integrating Mathematics and Science (AIMS), Project PRISMS, Operation Physics and Supplemental Science Education Video Programs. Textbooks are purchased with state funds.

Kansas — This state has conducted Summer Science Academies with such goals as improving elementary education, improving science teaching, creating a network of professionals in the schools and creating a model science curriculum.

Kentucky — A few programs in this state are the Space Education Program, helping to incorporate space education into the curriculum; the Elementary Science Leadership Project, strengthening principals' involvement in science education; and the Science Improvement Project, providing technical assistance to secondary school teachers teaching physical science.

Maine — Educators in Maine are working primarily with science curriculum development at the elementary school level. At the middle school level, efforts are being made to define the relationship between the middle school philosophy and science curriculum.

Massachusetts — Science education programs in Massachusetts vary between districts according to need. Since all programs are developed locally, no common curricula are established by the state.

Michigan — In 1986, Michigan initiated a program to improve science education and student achievement. Funded by state and local governments, business and industry, this program aims to improve teaching and learning at the high school level. Also, Mathematics/Science Challange Grants are funded by the Legislature.

Mississippi — Mississippi has a consumer science program called "Hands-on/Pre-chemistry/Physics" and an applied life science program, "Hands-on/Pre-biology." These are high school courses for non-college-bound students or students who need improvement in science before taking more advanced courses.

Missouri — Learner outcomes have been developed in Missouri for all academic subjects, and comprehensive, criterion-based tests will measure students' mastery of

these objectives. Development of these tests is funded through legislation in the Excellence in Education Act of 1985.

Montana — Montana hosts such programs as BEST (Better Elementary Science Teaching), STIR (Science Teaching Institute in the Rockies) and Project Partners for science education.

Nebraska — Hands-on science instruction in elementary and junior high schools is the professional development topic for science teachers in Nebraska. Also, the legislature has appropriated $30,000 for a new mathematics pilot exam, created to encourage students to continue their math studies.

Nevada — This state promotes science education through Project AIMS and by promoting writing for science concepts.

New Hampshire — A position paper on the status of math and science education in New Hampshire, which recognizes the need to renew teacher preparation programs, is being developed by the Department of Education and the University of New Hampshire's College of Engineering and Physical Sciences. Also, conferences have been conducted to acquaint teachers, administrators, school board members and legislators with the recommendations made by National Council of Teachers of Mathematics and the American Association for the Advancement of Science (Project 2061).

New Jersey — The hands-on process of science is being stressed in New Jersey's elementary schools. In secondary schools, the content of science courses is guided by a set of content-specific core proficiencies designed to provide a common base of information for each student. A two-year science requirement is mandated by the Legislature.

New York — A major thrust in New York's elementary schools has been the development of hands-on assessment. In high schools, the state's Regent Earth Science course is now more process oriented.

Oregon — The Oregon Cadre for Assistance to Teachers of Science (OCATS) is a statewide network of K-12 and higher education science teachers dedicated to improving instruction through staff development.

Pennsylvania — Some science education programs in Pennsylvania are AIMS, Science, Technology and Society (STS), and Principles of Technology.

Rhode Island — In Rhode Island's SCI-TECH program, science educators created telecommunication projects for student activities in climate, earthquakes, ecological systems, epidemics and wildflowers. This state also has a "Science Olympiad" to train teachers in science activities that enhance and extend the science curriculum.

South Carolina — South Carolina's science education programs include the Cartographic Project on South Carolina Maps and Aerial Photographs, principals' workshops in elementary and middle school science instruction, the Elementary Science Leadership Program, the Critical Teaching Needs Program, the South Carolina Critical Needs Certification Program and the Basic Skills Assessment Program in Science.

South Dakota — The Education for Economic Security Act and The Dwight D. Eisenhower Mathematics and Science Act provide in-services for science and math teachers. Students are guaranteed in-state college entrance if they have a full complement of science and math plus other academic subjects. Also, a

science and math advance-placement program will be implemented to encourage students in rural schools to study these subjects.

Texas — Science instruction is given in kindergarten through grade 12. Minimum time requirements exist in each grade for science courses. The State Board of Education established a state curriculum in response to a legislative mandate.

Utah — Science education improvement in Utah has three major thrusts. The first involves assisting science teachers in high schools as they attempt to qualify for endorsements required for science teaching assignments. The second uses in-service training for elementary school teachers in the State Elementary Science Core which gives a new scope and sequence to K-6 science instruction. The third activity increases in-service opportunities for updating science training for all science teachers K-12.

Vermont — Science education programs in Vermont include Principles of Technology, Operation Physics and Grow-Lab.

Virginia — The Science Service in Virginia is putting greater emphasis on program assessment and has developed an elaborate assessment model for statewide use. Program assessment is funded partially through the state legislature.

Wisconsin — Science Education Service Centers (SESC) have been established in several University of Wisconsin campuses.

Wyoming — Many problem-solving and hands-on workshops are being conducted in this state. Another current focus is the development of new science curriculum.

Appendix I

NCSL Science Education Survey Respondents

Dr. Linda Pledger
Mathematics Specialist
State Department of Education
50 N. Ripley Street
Montgomery, AL 36130-3901

Bill Fulton
Science Specialist
State Department of Education
4 State Capitol Mall
Little Rock, AR 72201-1071

Mary Gromko
Science Consultant
State Department of Education
201 E. Colfax Avenue
Denver, CO 80203

Sigmund Abeles
Science Consultant
State Department of Education
PO Box 2219
Hartford, CT 06145

V. Susie Oliphant
Director of Curriculum for Science
District of Columbia Public Schools
20th & Evarts Streets, NE
Washington, DC 20018

Phyllis Martin
Mathematics Consultant
Georgia Department of Education
1952 Twin Towers East
Atlanta, GA 30334

John Hawkins
Education Specialist, Science
Kathleen Nishimura
Educational Specialist, Mathematics
189 Lunalilo Home Road, 2nd Floor
Honolulu, HI 96825

Ron Moore
Director, Educational Assistance
Kansas State Department of Education
120 East Tenth Street
Topeka, KS 66612-1103

Rita Lindsey Osborne
Assistant Director
Kentucky Department of Education
Division of Curriculum
18th Floor CPT
Frankfort, KY 40601

Jackie Mitchell, Tom Keller
Math/Science Consultants
State Dept. of Educational Services
DECS, State House Station #23
Augusta, ME 04333

Dr. Elizabeth Twomey
Associate Commissioner
State Department of Education
Quincy, MA 02169

Dr. Sharif Shakrani
Curriculum Director
Michigan Department of Education
PO Box 30008
Lansing, MI 48854

Joyce C. Holly
Science Education Specialist
State Department of Education
Walter Sillers Building, Rm 604
Jackson, MS 39205

Otis Baker
Assistant Commissioner
Missouri Department of Secondary Education
205 Jefferson Street, PO Box 480
Jefferson City, MO 65102

Robert Briggs
Science Specialist
Office of Public Instruction
State Capitol
Helena, MT 59620

Roger Hudson
Administrator, Curriculum
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68509

Pat Boyd
Director, Basic Education
State Department of Education
400 West King Street
Carson City, NV 89710

Dr. Edward J. Hendry
Curriculum Supervisor, Science
Department of Education
101 Pleasant Street
Concord, NH 03301

Carol N. Scelza
Bureau of Curriculum & Technology
N.J. Dept. of Education, CN 500
Trenton, NJ 08625

Douglas S. Reynolds
Chief, Bureau of Science Education
Fredric Paul
Chief, Bureau of Mathematics Education
State Education Department
Albany, NY 12234

Cleo M. Meek
Consultant
State Dept. of Public Instruction
Room 276, Education Building
Raleigh, NC 27603-1712

Charles DeRemer
Director of Curriculum
Department of Public Instruction
600 E. Boulevard Avenue
Bismarck, ND 58505-0440

Frank Schirald
Assistant Director
State Department of Education
65 S. Front Street, Room 1005
Columbus, OH 43215

Ardis Christensen
Assistant Superintendent
Department of Education
700 Pringle Parkway, SE
Salem, OR 97310

G. Kip Bollinger
Science Education Advisor
Pennsylvania Department of Education
333 Market Street
Harrisburg, PA 17126

Edward Costa
Director, School Support Services
Room 201, Roger Williams Building
22 Hayes Street
Providence, RI 02908

Peggy W. Cain, Ph.D.
State Science Consultant
State Department of Education
1429 Senate Street
801 Rutledge Building
Columbia, SC 29201

Jim Hauck
Title II Director
Division of Education
700 Governors Drive
Pierre, SD 57501-2291

Leroy Psencik
Director, Division of General Education
Texas Education Agency
1701 North Congress Avenue
Austin, TX 78701-1494

LaMar Allred
Specialist, Science Education
William Earl
Specialist, Mathematics Education
Utah State Office of Education
250 East 500 South
Salt Lake City, UT 84111

George Tanner
Chief, Curriculum Unit
Department of Education
State Street
Montpelier, VT 05602

Claude Sandy
Director
Sciences and Elementary Education
State Department of Education
PO Box 6Q
Richmond, VA 23216

Arnold Chancellor
Director, Program Development
State Department of Public Instruction
PO Box 7841
Madison, WI 53707

William M. Futrell
Science/Mathematics Coordinator
State Department of Education
Hathaway Building
Cheyenne, WY 82001

National Conference
of State Legislatures
1560 Broadway, Suite 700
Denver, Colorado 80202

Non-Profit Organization
U.S. Postage
PAID
Denver, Colorado
Permit No. 3533

STATE LEGISLATIVE REPORT